

Claims

- [c1] 1.A radio frequency (RF) detector array for use with a magnetic resonance imaging (MRI) system, comprising:
a plurality of conductive array elements being substantially parallel to a conductive ground plane;
a plurality of capacitors, wherein at least one capacitor is shunted from each array element to the ground plane to adjust a corresponding electrical length of each conductive array element; and,
wherein a combination of each respective array element, at least one corresponding capacitor and the ground plane forms a resonator that resonates at a selected frequency.
- [c2] 2.The RF detector array of claim 1 wherein the array elements are selected from a group of structures consisting of conductive strips, rod, pipe, wire, and line structures
- [c3] 3.The RF detector array of claim 1 further comprising a plurality of capacitors interconnected between each array element and respective neighbor array elements to decouple a mutual inductance between the respective pairs of array elements.
- [c4] 4.The RF detector array of claim 1 further comprising a decoupling interface coupled to an end of each array element for decoupling each array element from the remaining array elements when the array elements are mutual inductively coupled.
- [c5] 5.The RF detector array of claim 1 wherein each of said plurality of array elements comprise a plurality of segments and further comprise a plurality of capacitors in series connection along the strip between respective neighboring segments of said array element for matching and reducing electrical field.
- [c6] 6.The RF detector array of claim 4 further comprising a plurality of matching devices for matching each decoupled array element to a selected impedance for any unmatched array elements.
- [c7] 7.The RF detector array of claim 4, wherein said decoupling interface comprises

at least one of reactive lumped-element circuits and distributive structure devices.

[c8] 8.The RF detector array of claim 6 wherein said matching devices comprises at least one of lumped-element circuits and distributive structure devices.

[c9] 9.The RF detector array of claim 1 wherein the detector array is operable as a receive-only detector.

[c10] 10.The RF detector array of claim 1 wherein the detector array is operable as a transmit-only detector.

[c11] 11.The RF detector array of claim 1 wherein the detector array is operable as a transmit and receive detector.

[c12] 12.A magnetic resonance imaging (MRI) system, comprising:
a computer;
a magnet assembly for generating a polarizing magnetic field;
a gradient coil assembly for applying gradient waveforms to said polarizing magnetic field along selected gradient axes; and
a detector array for applying RF energy to excite nuclear spins of an object to be imaged, and for thereafter detecting signals generated by excited nuclei of said object to be imaged, said detector array comprising:
a plurality of conductive array elements being substantially parallel to a conductive ground plane;
a plurality of capacitors, wherein at least one capacitor is shunted from each array element to the ground plane to adjust a corresponding electrical length of each conductive array element; and,
wherein a combination of each respective array element, at least one corresponding capacitor and the ground plane forms a resonator that resonates at a selected frequency; and,
wherein signals detected by said detector array are processed by said computer to produce MR images of said object to be imaged.

[c13] 13.The system of claim 12 further comprising a decoupling interface coupled to an end of each array element for decoupling each conductive array element

from the remaining conductive array element when the array elements are mutual inductively coupled.

- [c14] 14.The system of claim 12 further comprising a plurality of matching devices for matching each decoupled conductive strip to a selected impedance for any unmatched strips.
- [c15] 15.The system of claim 12 wherein the detector array is operable as a receive-only detector.
- [c16] 16.The system of claim 12 wherein the detector array is operable as a transmit-only detector.
- [c17] 17.The system of claim 12 wherein the detector array is operable as a transmit and receive detector.

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